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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/091,515	03/07/2002	Philip Charles Danby Hobbs	YOR920010496US1	8797

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EXAMINER

SONG, SARAH U

ART UNIT PAPER NUMBER

2874

DATE MAILED: 09/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/091,515

Applicant(s)

HOBBS ET AL.

Examiner

Sarah Song

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-48 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-48 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 May 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>0606</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicant's communication filed on June 6, 2006 has been carefully considered and placed of record in the file. Claim 48 is new. Claims 1-48 are pending.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. **Claims 1 and 48 are rejected under 35 U.S.C. 102(e) as being anticipated by Gunn, III et al. (U.S. Patent 6,917,727 newly cited).**

4. Regarding claims 1 and 48, Gunn, III et al. discloses an apparatus for producing a modulated optical signal, comprising an antenna (e.g. 440, 460) for communicating with a waveguide 400 and with an externally-applied optical field (i.e. light) and having an output port; and an electrically-variable-impedance device connected at the output port of the antenna, capable of responding at a frequency of an externally-applied optical field and having its impedance at the optical frequency changed by an applied electrical signal (i.e. voltage). See column 14, line 13 through column 15, line 34.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 1-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Modell et al. (U.S. Patent 6,563,185 previously relied upon).**

7. Regarding claim 1, 39 and 46, Modell et al. discloses an apparatus for producing a modulated optical signal, comprising an antenna (e.g. 222A, 223A) for communicating with a waveguide and with an externally-applied optical field (e.g. 202A) and having an output port; and an electrically-variable-impedance device connected at the output port of the antenna, capable of responding at a frequency of an externally-applied optical field and having its impedance at the optical frequency changed by an applied electrical signal (i.e. voltage). See column 14, lines 32-53. Modell et al. also discloses the device capable of responding to more than one frequency to radiate a mixing product between the optical frequencies. See column 14, lines 4-31. See Figure 3A.

8. Regarding claims 12 and 47, Modell et al. also discloses an apparatus for detecting an optical signal, comprising an antenna structure (e.g. 20B, 21B) having an output port; and an electrically-connected detector connected at the antenna's output port, capable of responding at a frequency of the optical signal in a waveguide and for producing a detected electrical signal at baseband. See column 3, lines 17-41. Modell et al. also discloses the device capable of responding at more than one frequency producing a detected electrical signal at a frequency corresponding to a mixing product of the optical frequencies. See column 20, line 67 through column 21, line 30. See Figure 1B.

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9. Model et al. does not expressly disclose a waveguide communicating with the antenna of Figure 3A or 1B. However, Model et al. discloses a similar antenna device in Figure 2F in communication with a waveguide. Furthermore, waveguides are well known in the art for providing low loss propagation of optical signals. The modification would have been obvious since Model et al. suggests the disclosed devices for high speed optoelectronic integrated circuits (column 20, lines 52-59), which are known in the art to comprise waveguide circuits. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a waveguide in communication with the antennae 222A, 223A or 20B, 21B of Model et al. in order to provide low loss propagation of the optical signal to or from the device.

10. Regarding claims 2-4, 10, 11, 13-15 and 21-23, the electrically-variable-impedance device comprises a tunnel junction, wherein the tunnel junction comprises a metal-insulator-metal (MIM) structure. More specifically, the MIM tunnel junction comprises closely juxtaposed metal lines with a layer of metal oxide therebetween. See column 7, line 50 through column 8, line 6. Additionally, the electrically-connected detector comprises a semiconductor tunnel junction. See column 16, lines 65-67. Furthermore, Model et al. discloses the device may comprise a metal-insulator-superconductor barrier. See column 6, lines 51-53.

11. Regarding claims 5 and 16, Model et al. does not expressly disclose the metal line comprising nickel and the oxide comprising nickel oxide. Nickel and nickel oxide were known in the art at the time of the invention as a suitable material for a MIM tunnel junction for an optical device. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide nickel and nickel oxide in the MIM tunnel junction

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of Modell et al. since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. See MPEP 2144.07.

12. Regarding claims 6 and 17, Modell et al. discloses the area of the junction to range from sub-microns up to hundred of microns but does not expressly disclose the area of the junction to be less than 100 nm square. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the claimed dimension in order to provide a wavelength specific device since Modell et al. teaches that scaling antenna dimensions affects the wavelength range of the device.

13. Regarding claims 7 and 18, Modell et al. does not expressly disclose a capacitance to be less than 100 attofarads. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a capacitance of less than 100 attofarads since it has been that discovering optimum or workable ranges involves only routine skill in the art. See MPEP 2144.05(II)(A)(B).

14. Regarding claims 8, 9, 19 and 20, Modell et al. does not expressly disclose a Josephson junction or a Schottky barrier. Josephson junctions and Schottky barriers were well known in the art for tunneling devices at the time of the invention. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide any well known tunneling junction since applicant has not disclosed that the particular junction solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with any type of tunneling optical device.

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15. Regarding claims 24 Model et al. discloses an apparatus comprising a transmitting antenna (e.g. 120C, 121C) for communicating with a waveguide and having an output port; and an electrically-variable-impedance device connected at the output port of the transmitting antenna, capable of responding at a frequency of an externally-applied optical field and having its impedance at the optical frequency changed by an applied electrical signal (i.e. voltage). See Figures 2B and 2C. Model et al. also discloses an apparatus comprising a receiving antenna structure (e.g. 20B, 21B) having an output port; and an electrically-connected detector connected at the antenna's output port, capable of responding at a frequency of the optical signal in a waveguide and for producing a detected electrical signal at baseband. See Figures 1A and 1B.

16. Model et al. does not expressly disclose a waveguide in communication with both the transmitting and receiving antennae. However, Model et al. discloses a similar antenna device in Figure 2F in communication with a waveguide. Furthermore, waveguides are well known in the art for providing low loss propagation of optical signals. Model et al. also discloses in integrated circuits. The modification would have also been obvious since Model et al. suggests that the devices may be combined to have applications in high speed optoelectronic integrated circuits (column 20, lines 52-59), which are known to comprise waveguides. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a waveguide in communication with the antennae 222A, 223A or 20B, 21B of Model et al. in order to provide low loss propagation of the optical signal to or from the device in a compact device.

17. Regarding claims 25-27, 33 and 34, Model et al. discloses a source of optical radiation incident on the transmitting antenna by unguided propagation (performed above a top surface of

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said waveguide). See Figure 3A. Although guided propagation (e.g. along said waveguide) of the optical radiation incident on the antenna is not expressly disclosed, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide guided propagation since it was known in the art to guide the optical radiation around any additional components of an integrated circuit.

18. Regarding claims 28-30, the method claims would also have been obvious as setting forth requisite steps for operation of the devices as discussed above.

19. Regarding claims 31, it is noted that a portion of the externally-applied optical field is scattered (as a result of modulation) within said waveguide.

20. Regarding claims 36 and 37, Moddel et al. appears to disclose direct detection. However, coherent detection was also known in the art as an alternative to direct detection and therefore would have been obvious to one of ordinary skill in the art.

21. Regarding claim 32, 35 38 and 40-45, Moddel et al. disclose various applications for the devices in place of prior art semiconductor devices, which were known in the art to be utilized in fiber LANs, optical backplanes comprising circuit boards, chip modules, communication systems comprising a plurality or interconnects for one-to-many or many-to-many connections.

Therefore, the incorporation of the device of Moddel et al. in to the various prior art systems would have been obvious in order to provide advantages of speed, simplified input/outputs, and ease of fabrication as taught by Moddel et al. See column 20, lines 38-67.

Response to Arguments

22. Applicant's arguments filed June 6, 2006 have been fully considered but they are not persuasive.

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23. Paragraph 3 of the previous Office Action (paragraph 6 above) has been corrected to properly indicate all claims that are rejected as unpatentable over Modell, as was evident by the body of the rejection as set forth previously and herein above.

24. In response to applicant's argument with respect to claims 1-47 that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., antenna being a waveguide-to-coax adapter or waveguide to conductor coupling structure, antenna integrally or monolithically formed with the waveguide, a planar waveguide, high index contrast waveguides vs. low-index contrast waveguides) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

25. Furthermore, the antenna of Modell clearly meets the limitation for the claimed "antenna". Claim limitations are given their broadest reasonable interpretation. Limitations appearing in the specification but not recited in the claim are not read into the claims. Thus the term "antenna" has been interpreted according to its plain meaning, as no special definition has been provided in the specification. Regarding the functional recitation associated with the antenna, it is noted that if the prior art structure is capable of performing the intended use, then it meets the claim.

26. Further addressing Applicant's statement that an optical fiber is not a waveguide, Examiner respectfully disagrees. The term "waveguide" itself is understood in the art to encompass both optical fiber waveguides as well as planar waveguides. Claims 1-47 do not

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distinguish the type of waveguide so as to preclude an optical fiber. Furthermore, it is noted that Applicant's claim 39 recites an embodiment wherein the waveguide is a fiber.

27. Regarding claim 48, Gunn, III et al. is deemed to meet the claimed limitations wherein the contacts are the antenna (i.e. waveguide to conductor coupling structures), the waveguide is a planar waveguide, and the antenna and waveguide are monolithically integrated (see Figures). The new rejection of claim 1 over Gunn, III et al. is necessitated by the dependency of claim 48 upon claim 1.

Conclusion

28. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sarah Song whose telephone number is 571-272-2359. The examiner can normally be reached on M-Th 7:30am - 6:00pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on 571-272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Sarah Song
Primary Examiner
Art Unit 2874